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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/648,562

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Gavin P. Towler

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EXAMINER

ECHELMEYER, ALIX ELIZABETH

ART UNIT

PAPER NUMBER

1745

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
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3 MONTHS

03/20/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No. 10/648,562	Applicant(s) TOWLER ET AL.	
	Examiner Alix Elizabeth Echelmeyer	Art Unit 1745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 January 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-35 is/are pending in the application.
- 4a) Of the above claim(s) 13-35 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-12 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

1. This Office Action is in response to the amendment filed January 3, 2007. Claim 1 has been amended. Claims 13-35 are withdrawn from a previous restriction requirement. Claims 1-12 are rejected finally for the reasons given below.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-4 and 6-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bloomfield et al. (US Patent 3,649,360) in view of Schirmer et al. (US Patent 4,488,866) and Gelsey (US Patent 7,108,933).

Bloomfield et al. teach a hydrogen generation system for a fuel cell.

Regarding claim 1, the hydrogen generation system includes a hydride and a water reservoir. Water from the reservoir reacts with the hydride to produce hydrogen. A wick attaches the reservoir to the hydride bed. Variations in the pressure in the hydride bed influence the amount of water that travels through the wick to the bed (column 2 lines 18-39).

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As for claims 2 and 3, Bloomfield et al. teach that the metallic hydride may be calcium hydride, lithium hydride, magnesium hydride, sodium hydride, or potassium hydride (column 2 lines 71-72; column 3 lines 1).

With regard to claim 4, as discussed above, water is used to react with the hydride to generate hydrogen.

As for claim 10, for the wicking system to work, the water reservoir must be under pressure.

Bloomfield et al. fail to teach a third compartment within the housing for holding an absorbent for absorbing carbon dioxide.

Schirmer et al. teach an absorption system to remove carbon dioxide from hydrogen gas to purify the hydrogen gas stream (Figure 10; column 22 lines 2-6, 26-30).

It would be desirable to use an absorption system as taught by Schirmer et al. in the hydrogen generation system of Bloomfield et al. in order to provide pure hydrogen. Further, it would have been obvious to one having ordinary skill in the art at the time of the invention to include the carbon dioxide absorption system in the same housing as the hydrogen generation system since the hydrogen generation system is designed to be easily portable. It has been held that forming in one piece an article, which has formerly been formed in two pieces, involves only routine skill in the art. MPEP 2144.04(VB).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to include a carbon dioxide absorber, as the one taught by

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Schirmer et al., in the hydrogen generation system of Bloomfield et al. in order to purify the hydrogen generated by the system.

Bloomfield et al. in view of Schirmer et al. fail to teach that the means for restricting fluid flow between the first and second compartments provides for on/off control of fluid flow on demand as claimed in claim 1, and also detailed in claims 6-9.

Gelsey teaches a hydrogen storage system for storing hydrogen for use in a fuel cell. The system may contain valves, covers, microcontrollers, etc. to control the generation of hydrogen (column 6 lines 18-24). For example, valves may be opened or closed to regulate the amount of water or water vapor that is exposed to a metal hydride (column 5 lines 49-57).

Gelsey further teaches that the control systems make possible the control of power generation, for example when the fuel cell generates power and when it does not, by controlling the delivery of hydrogen fuel (column 5 lines 24-31).

It would be desirable to use the control mechanisms of Gelsey, such as the valve and the microcontrollers to control the valve, in the system of Bloomfield et al. in order to control the power output of the fuel cell.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use the valves and microprocessors of Gelsey in the hydrogen generator of Bloomfield et al. in order to control the power output of the fuel cell.

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4. Claims 5, 11 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bloomfield et al., Schirmer et al. and Gelsey as applied to claim 1 above, and in further view of Hockaday et al. (US Patent 6,544,400).

The teachings of Bloomfield et al., Schirmer et al. and Gelsey as discussed above are incorporated herein.

Bloomfield et al. in view of Schirmer et al. and Gelsey teach a hydrogen generation system for a fuel cell. Bloomfield et al. further teach that a membrane impermeable to water can be used to isolate components of the system (column 4 lines 39-42).

Bloomfield et al. in view of Schirmer et al. and Gelsey fail to teach that the membrane can be used during operation to allow passage of hydrogen gas but not water.

Hockaday et al. teach a portable hydrogen generation system. The system has two chambers: one with the fuel and the second that contains moisture or water vapor. The fuel passes through a membrane to the moist chamber, where it forms hydrogen (column 12 lines 39-67; column 13 lines 1-7).

Regarding claim 5, the generated hydrogen gas passes through an elastic, hydrophobic membrane before being delivered to the fuel cell (column 12 lines 57-66). The membrane prevents the contamination of the fuel cell anode by water but still allows hydrogen fuel to the fuel cell.

With regard to claim 11, Hockaday et al. teach a bladder for pressurizing the reactant chambers of the system (column 9 lines 62-67).

As for claim 12, Hockaday et al. further teach a flexible diaphragm containing the membrane (column 13 lines 1-2).

Hockaday et al. teach that this feedback mechanism, the combination of the membrane, diaphragm and bladder, allows the generating system to automatically maintain constant pressure or a constant flow rate of hydrogen (column 3 lines 62-64).

It would be desirable to one having ordinary skill in the art to provide a hydrophobic membrane for the hydrogen supply to the fuel cell in order to prevent poisoning of the fuel cell. It would also be desirable to one having ordinary skill in the art to use a flexible diaphragm in combination with the hydrophobic membrane to control the transfer of hydrogen to the anode.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use the membrane, bladder and diaphragm of Hockaday et al. in the hydrogen generation system of Bloomfield et al. in order to prevent water or water vapor from entering the fuel cell and to better control the delivery of hydrogen to the fuel cell.

Response to Arguments

5. Applicant's arguments with respect to claims 1-4 and 6-10 have been considered but are moot in view of the new grounds of rejection and the amendment.

6. Applicant's arguments with respect to claim 11, the bladder limitation, have been fully considered but they are not persuasive. Claim 11 is drawn to "a bladder ... for containing a gas under pressure." As stated above, the bladder of Hockaday et al. is for

pressurizing the reactant chambers of the system. Since the system of Hockaday et al. is integrated, the bladder is disposed with the liquid. It also contains a gas under pressure.

Conclusion

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alix Elizabeth Echelmeyer whose telephone number is 571-272-1101. The examiner can normally be reached on Mon-Fri 7-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's trainer, Susy N. Tsang-Foster can be reached on 571-272-1293. The fax phone

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number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Alix Elizabeth Echelmeyer
Examiner
Art Unit 1745

aee



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PRIMARY EXAMINER